



THIRD SPACE  
LEARNING

# Diagnostic Questions

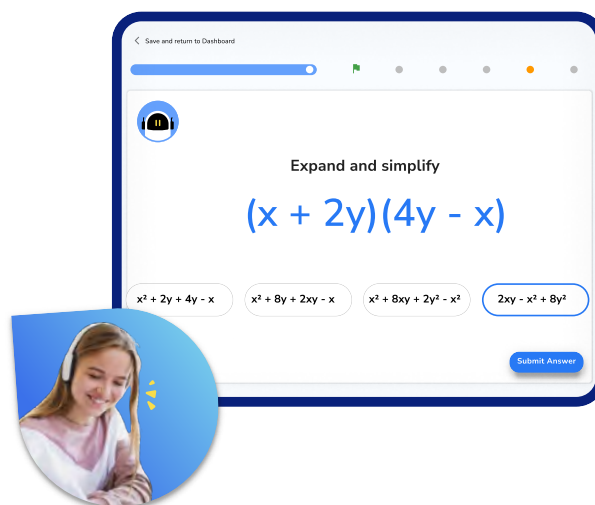
Geometry in the Coordinate  
Plane | Geometry & Measure

## This resource in a nutshell

Diagnostic questions are a quick and easy way of assessing your students' knowledge and understanding of a particular topic.

Students may be struggling with **geometry in the coordinate plane** for a number of different reasons. Diagnostic questions can help to identify the particular misconception that the student has and help to determine the specific support they will need in order to improve.

They are low stakes and support students developing metacognition around how their learning is progressing and what they need to do to improve further.



At Third Space Learning, we use diagnostic questions before and after online tutoring sessions to identify gaps and track progress, an example of this is shown above.

## How to use the questions in this resource

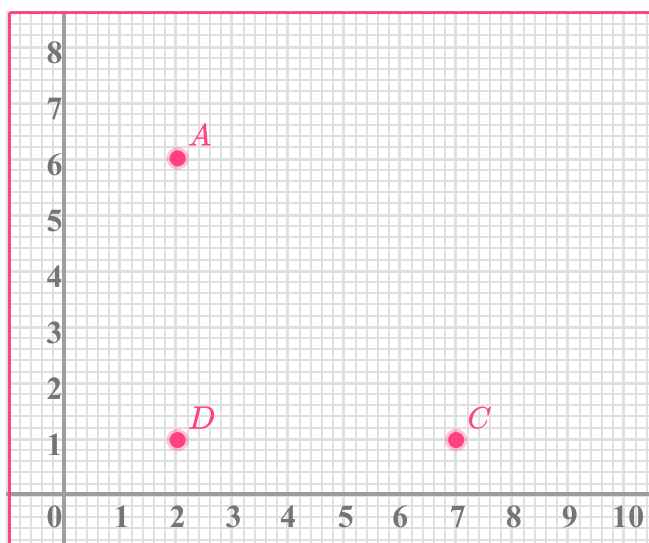
There are 20 multiple choice questions, each designed to assess each of the key skills required to master the given topic. Each question has **one correct answer** and **three carefully chosen incorrect answers** that are designed to identify and highlight fundamental misconceptions, including: **Rounding**, **Reading scales**, **Converting units of time**, and **Fractions of an amount**.

When answering these questions, students should be **encouraged to explain why they have chosen a particular answer**, and why the other three answers are incorrect. This can be done verbally in small groups, or written down on the worksheet or in their books.

This resource has been designed to be as **flexible** as possible with questions that can be easily chopped up and reordered, and come with a separate answer sheet that details all of the misconceptions highlighted in the answers.

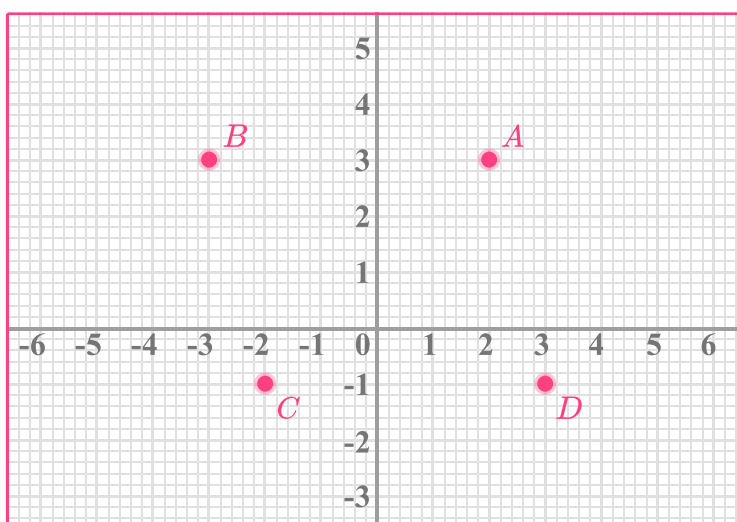
## Diagnostic Questions: Geometry in the Coordinate Plane

1. Find the coordinates of point  $B$ , such that  $ABCD$  is a square:



A) (6, 7)	B) (4.5, 3.5)
C) (7, 6)	D) (6, 5)

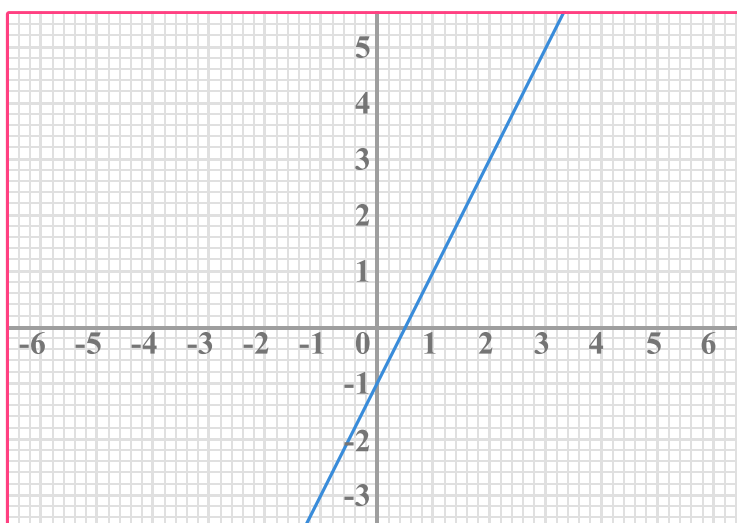
2. The corners of a parallelogram are plotted as coordinates.  
What are the coordinates of point  $D$ ?



A) (3, -1)	B) (3, 1)
C) (-1, 3)	D) (-3, -1)

## Diagnostic Questions: Geometry in the Coordinate Plane

3. Calculate the gradient of the line:



A) -1	B) 2
C) 0.5	D) -2

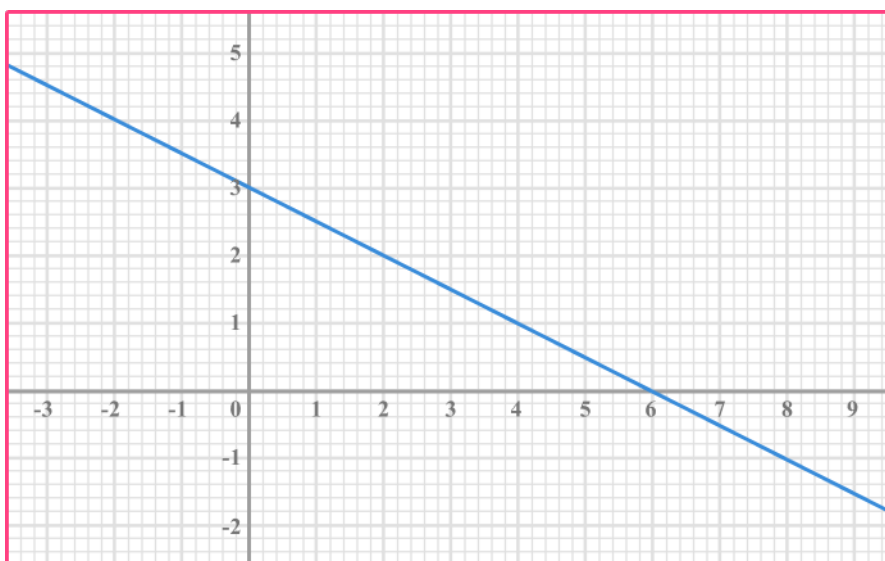
4. Calculate the gradient of the line:



A) 3	B) $-\frac{1}{3}$
C) 3.33	D) -3

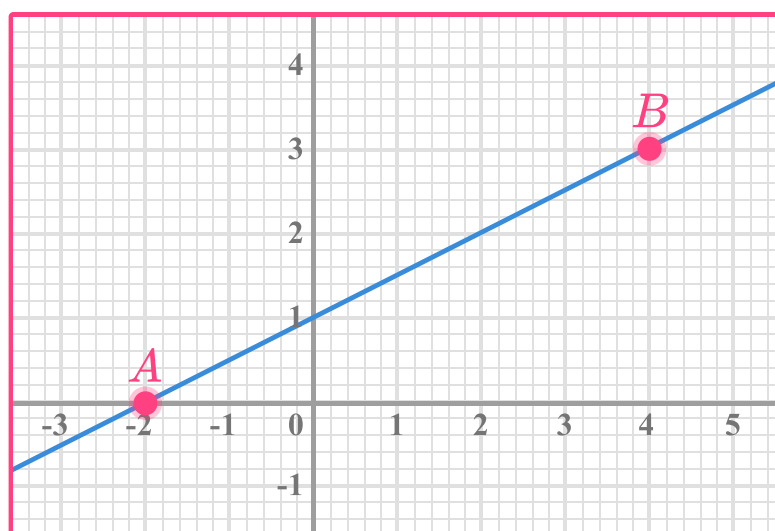
## Diagnostic Questions: Geometry in the Coordinate Plane

5. Calculate the gradient of the line:



A) $\frac{1}{2}$	B) -2
C) $-\frac{1}{2}$	D) 2

6. Points  $A$  and  $B$  lie on the line with equation  $y = \frac{1}{2}x + 1$   
Find the midpoint of line segment  $AB$ :

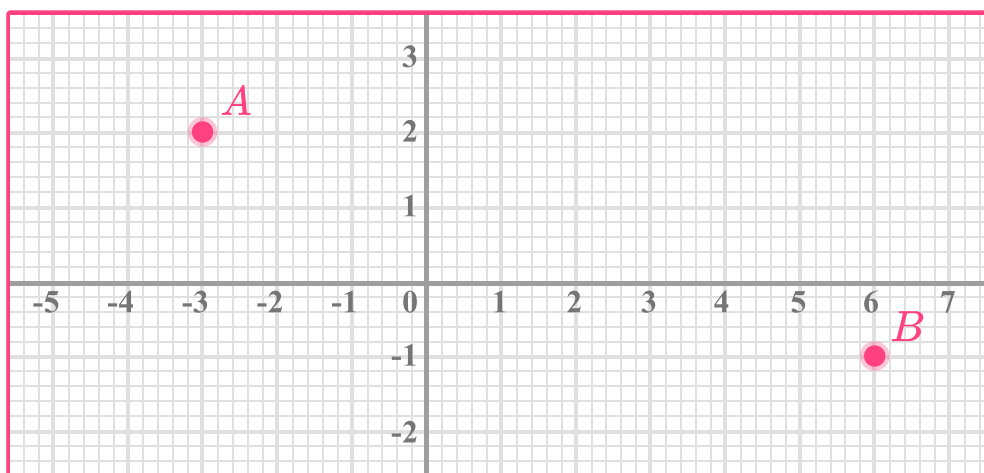


A) (1, 1.5)	B) (3, 1.5)
C) (1.5, 1)	D) (2, 3)

## Diagnostic Questions: Geometry in the Coordinate Plane

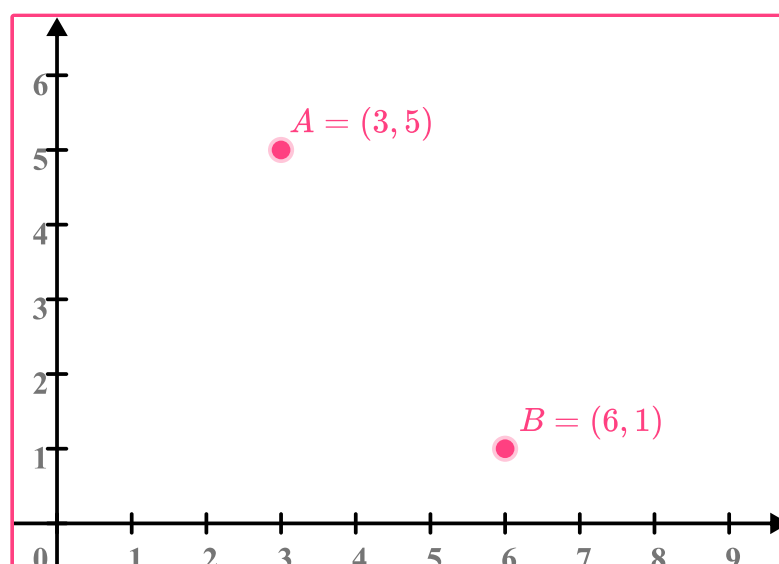
7. Points  $A$  and  $B$  lie in the  $xy$ -plane.

Find the midpoint of  $AB$ :



A) (0.5, 1.5)	B) (4.5, -1.5)
C) (1.5, 0.5)	D) (3, 1)

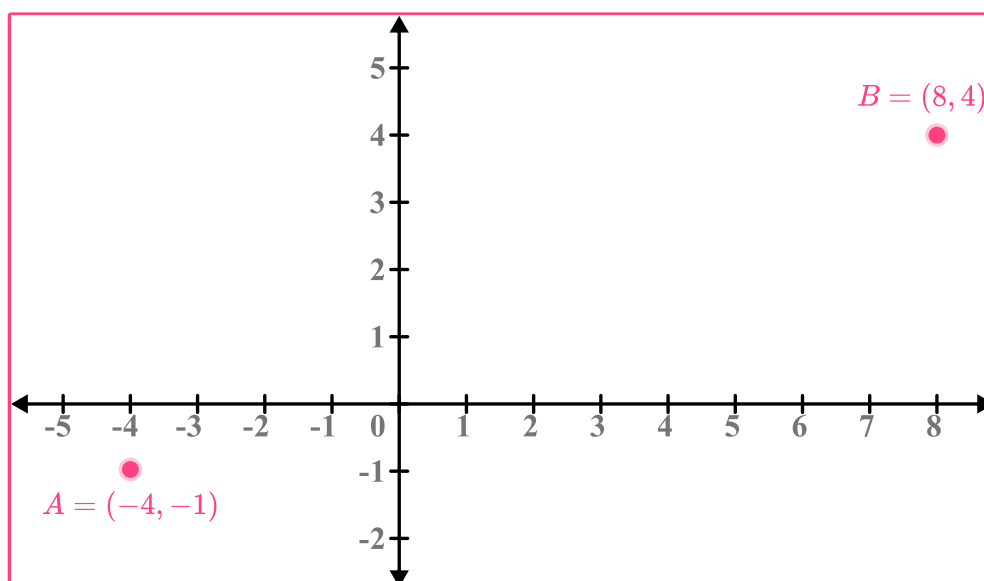
8. Find the length of line segment  $AB$ :



A) 4	B) 5
C) 25	D) 7

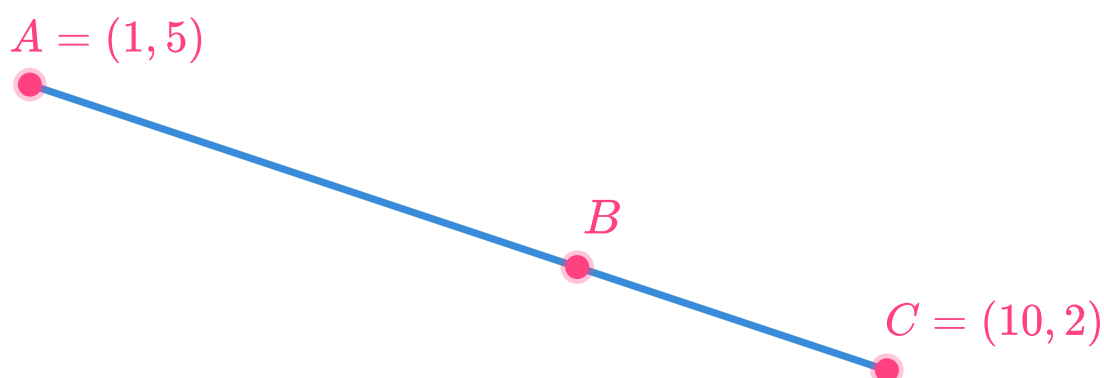
## Diagnostic Questions: Geometry in the Coordinate Plane

9. Find the length of line segment  $AB$ :



A) 12	B) 17
C) 13	D) 5

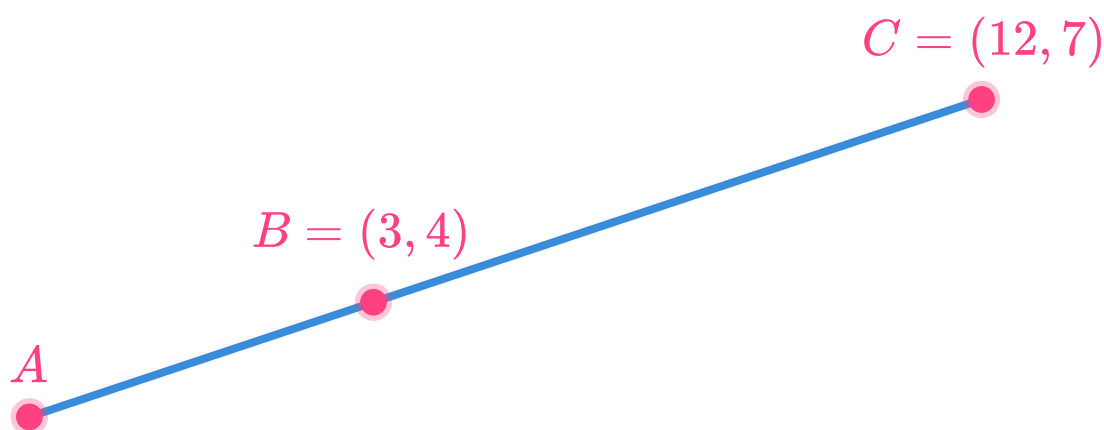
10. The point  $B$  lies on line segment  $AC$  such that  $AB : AC = 2 : 1$   
Find the coordinates of point  $B$



A) (7, 3)	B) (4, 4)
C) (5.5, 3.5)	D) (3, 6)

## Diagnostic Questions: Geometry in the Coordinate Plane

11. The point  $B$  lies on line segment  $AC$  such that  $AB : BC = 2 : 3$   
Find the coordinates of point  $A$



A) $(-6, 1)$	B) $(-3, 2)$
C) $(-10.5, -0.5)$	D) $(1, 1)$

12. Straight line  $T$  has equation  $y = mx + c$ . Find the values of  $m$  and  $c$  such that:

- Line  $T$  is parallel to the line  $y = 2x + 1$
- Line  $T$  passes through the point  $(4, 5)$

A) $m = 2, c = 5$	B) $m = 2, c = -6$
C) $m = 8, c = 6$	D) $m = 2, c = -3$



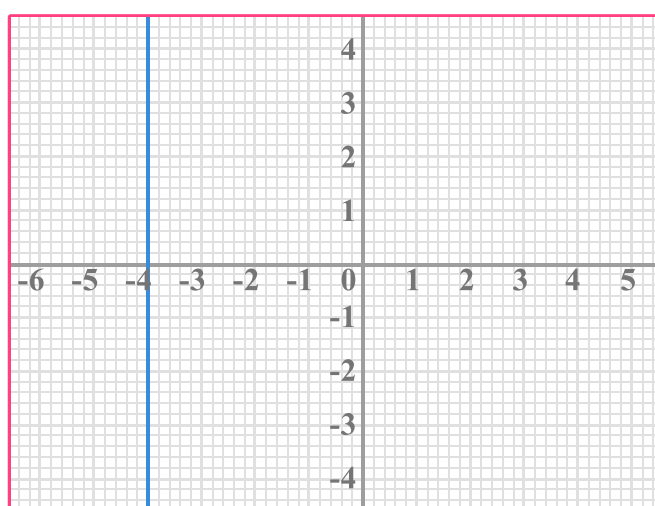
## Diagnostic Questions: Geometry in the Coordinate Plane

13. Straight line  $Q$  has equation  $y = mx + c$ . Find the values of  $m$  and  $c$  such that:

- Line  $Q$  is perpendicular to the line  $y = 2 - \frac{x}{3}$
- Line  $Q$  passes through the point  $(1, -2)$

A) $m = -\frac{1}{3}, c = -\frac{5}{3}$	B) $m = 3, c = -7$
C) $m = 3, c = -5$	D) $m = \frac{1}{3}, c = \frac{7}{3}$

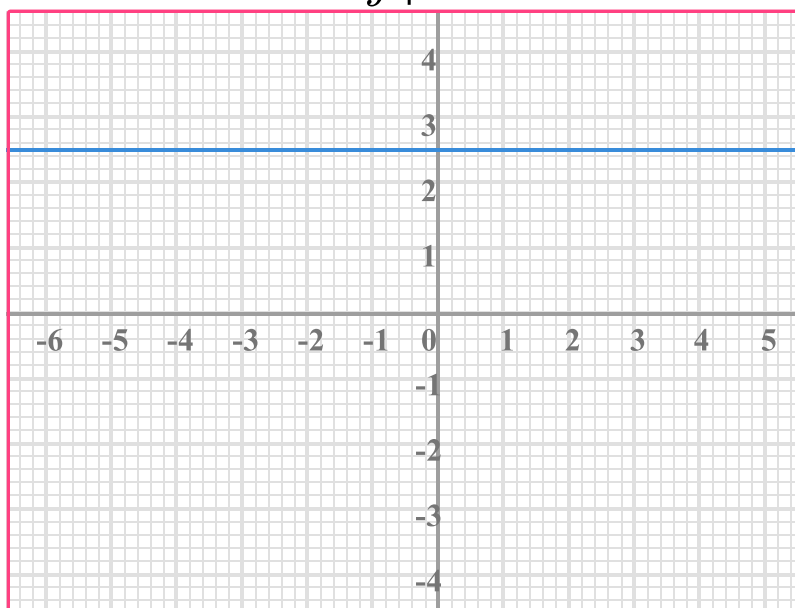
14. Find the equation of this line in the  $xy$ -plane:



A) $y = -4$	B) $x = -4$
C) $x = 4$	D) $y = x - 4$

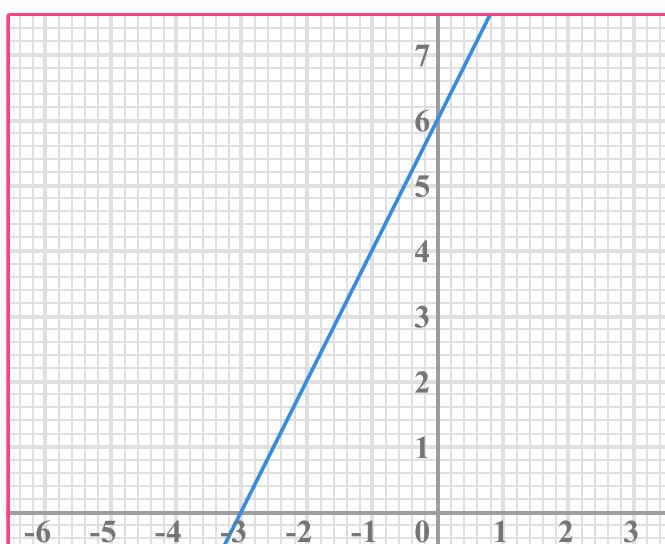
## Diagnostic Questions: Geometry in the Coordinate Plane

15. Find the equation of this line in the  $xy$ -plane:



A) $y = x + 2.5$	B) $x = 2.5$
C) $y = 3$	D) $y = 2.5$

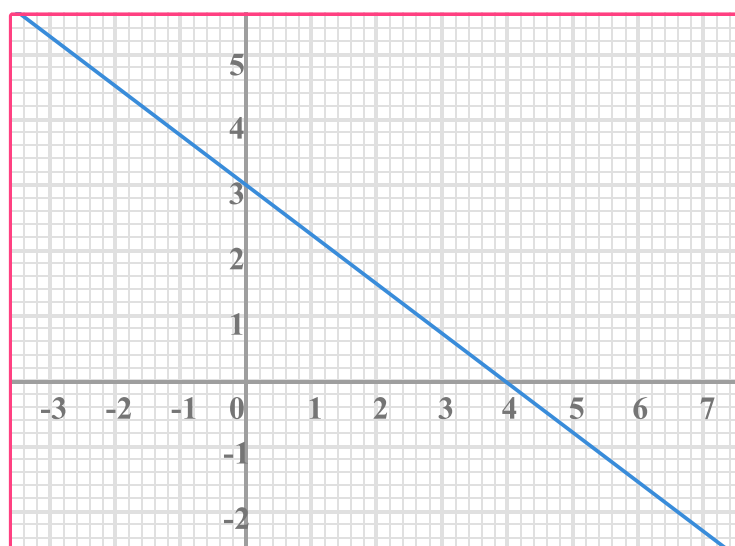
16. Find the equation of the line in the form  $y = mx + c$



A) $y = 2x + 6$	B) $y = x + 3$
C) $y = 2x - 3$	D) $y = 6x - 3$

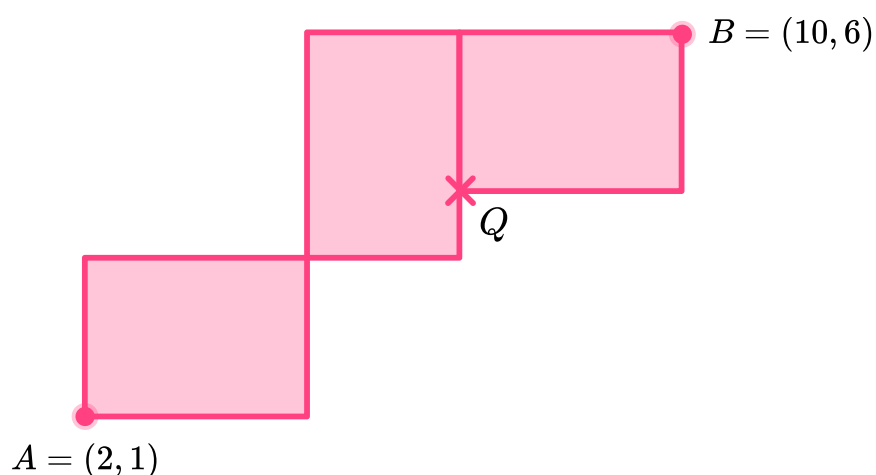
## Diagnostic Questions: Geometry in the Coordinate Plane

17. Identify the equation of the line:



A) $3y + 4x = 12$	B) $y = 3 - 4x$
C) $4y + 3x = 12$	D) $3y + 4x = 0$

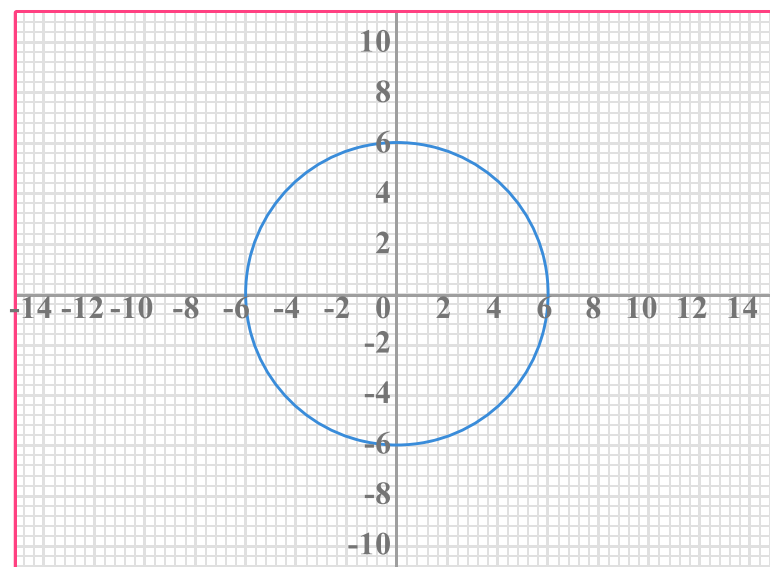
18. Three congruent rectangles are placed in the  $xy$ -plane as shown. Determine the coordinates of point  $Q$ :



A) (6, 3.5)	B) (4, 2.5)
C) (8, 3)	D) (7, 4)

## Diagnostic Questions: Geometry in the Coordinate Plane

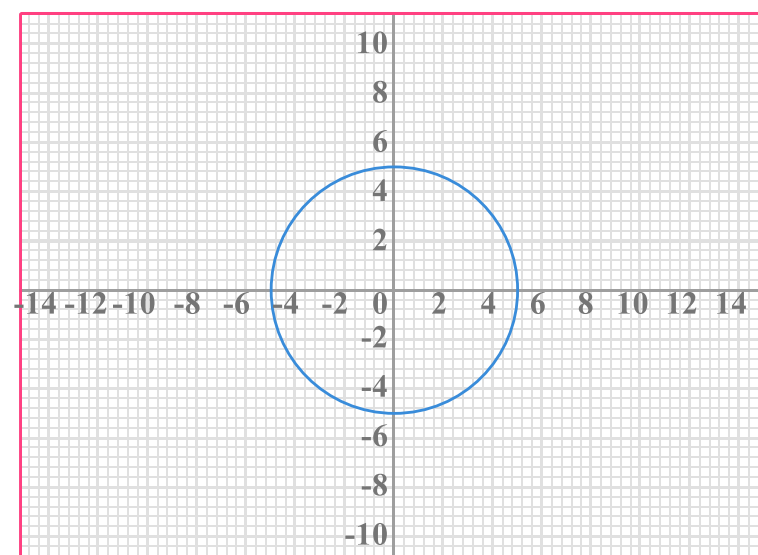
19. Determine the equation of the circle:



A) $x^2 - y^2 = 36$	B) $x^2 + y^2 = 36$
C) $x^2 + y^2 = 6$	D) $y = (x + 6)(x - 6)$

20. The equation of the given circle is  $x^2 + y^2 = 25$ .

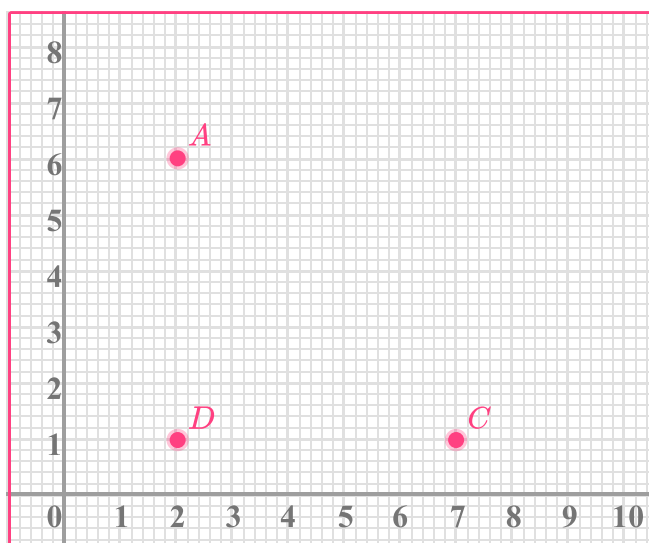
Find the equation of the line tangent to the circle at the point (3, 4)



A) $y = \frac{4}{3}x$	B) $y = \frac{3}{4}x + \frac{7}{4}$
C) $y = \frac{25}{4} - \frac{3}{4}x$	D) $y = -\frac{3}{4}x$

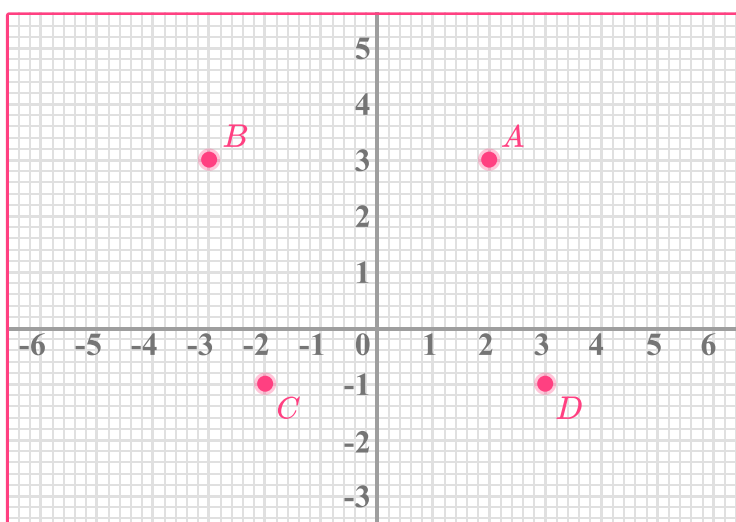
## Diagnostic Questions: Geometry in the Coordinate Plane Answers

1. Find the coordinates of point  $B$ , such that  $ABCD$  is a square:



- A) (6, 7) Student ordered the  $x$  and  $y$  values incorrectly  
B) (4.5, 3.5) Student chose the midpoint of  $AC$   
C) (7, 6) Correct answer  
D) (6, 5) Student was one unit out in both horizontal and vertical

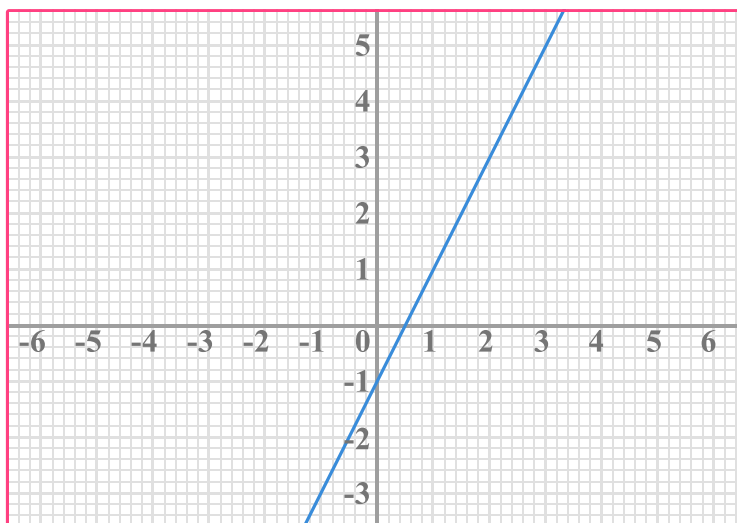
2. The corners of a parallelogram are plotted as coordinates.  
What are the coordinates of point  $D$ ?



- A) (3, -1) Correct answer  
B) (3, 1) Student forgot to write the sign of the  $y$  value  
C) (-1, 3) Student wrote  $x$  and  $y$  values in wrong order  
D) (-3, -1) Student wrote the wrong sign for the  $x$  value

## Diagnostic Questions: Geometry in the Coordinate Plane Answers

3. Calculate the gradient of the line:



A) -1 Student wrote down the value of the  $y$ -intercept

B) 2 Correct answer

C) 0.5 Student found the value at which the line crosses the  $x$ -axis

D) -2 Student made a sign error in their calculation

4. Calculate the gradient of the line:



A) 3 Student got the sign of the gradient wrong

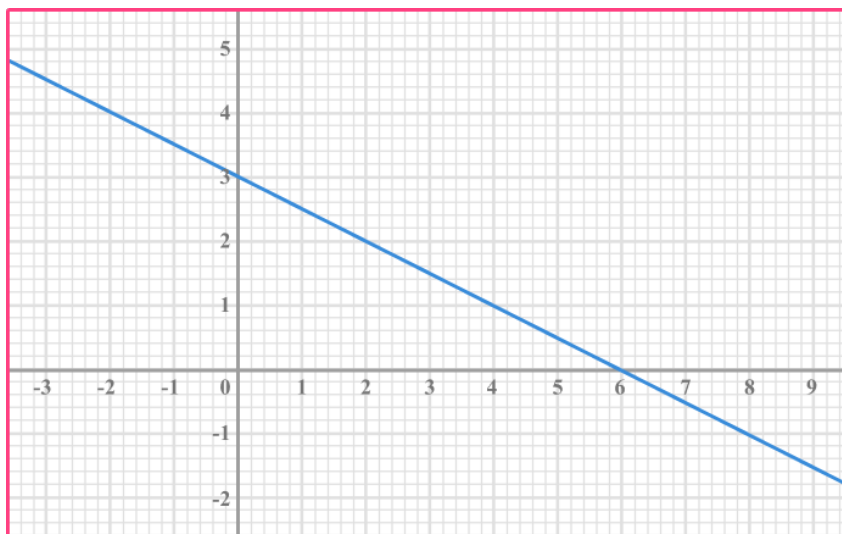
B)  $-\frac{1}{3}$  Student calculated run over rise, instead of vice versa

C) 3.33 Student found the  $x$ -intercept

D) -3 Correct answer

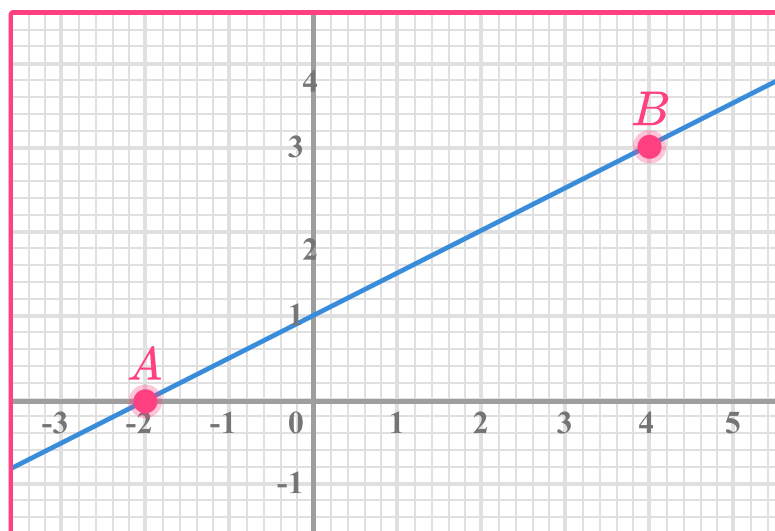
## Diagnostic Questions: Geometry in the Coordinate Plane Answers

5. Calculate the gradient of the line:



- A)  $\frac{1}{2}$  Student forgot to include the sign of the gradient
- B) -2 Student calculated change in  $x$  over change in  $y$
- C)  $-\frac{1}{2}$  Correct answer
- D) 2 Student divided  $x$ -intercept by  $y$ -intercept

6. Points  $A$  and  $B$  lie on the line with equation  $y = \frac{1}{2}x + 1$   
Find the midpoint of line segment  $AB$ :

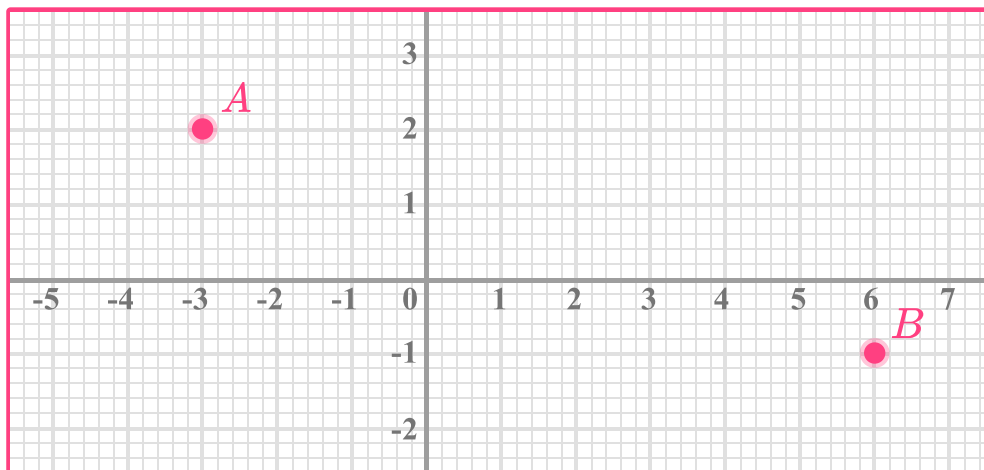


- A) (1, 1.5) Correct answer
- B) (3, 1.5) Student subtracted components before dividing by 2
- C) (1.5, 1) Student wrote the  $x$  and  $y$  values in the wrong order
- D) (2, 3) Student forgot to divide by two after adding components

## Diagnostic Questions: Geometry in the Coordinate Plane Answers

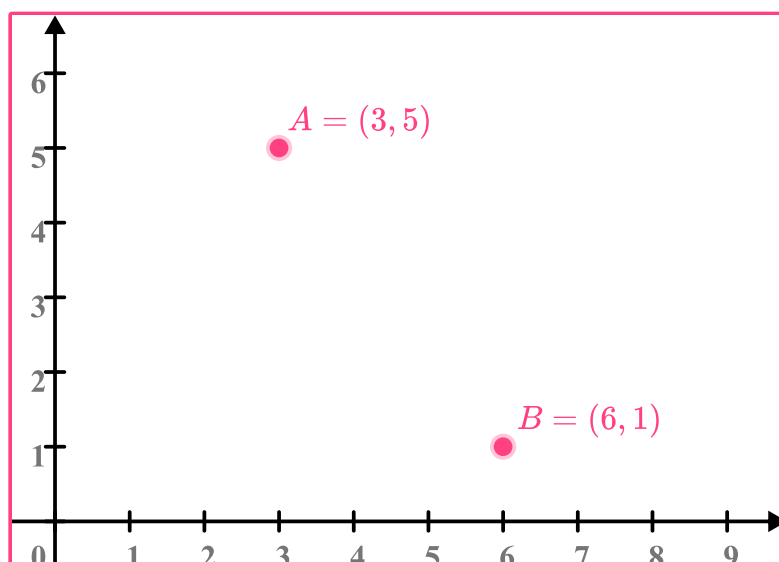
7. Points  $A$  and  $B$  lie in the  $xy$ -plane.

Find the midpoint of  $AB$ :



- A) (0.5, 1.5) Student wrote the  $x$  and  $y$  values in the wrong order
- B) (4.5, -1.5) Student made errors dealing with negative numbers
- C) (1.5, 0.5) Correct answer
- D) (3, 1) Student forgot to divide component sums by two

8. Find the length of line segment  $AB$ :

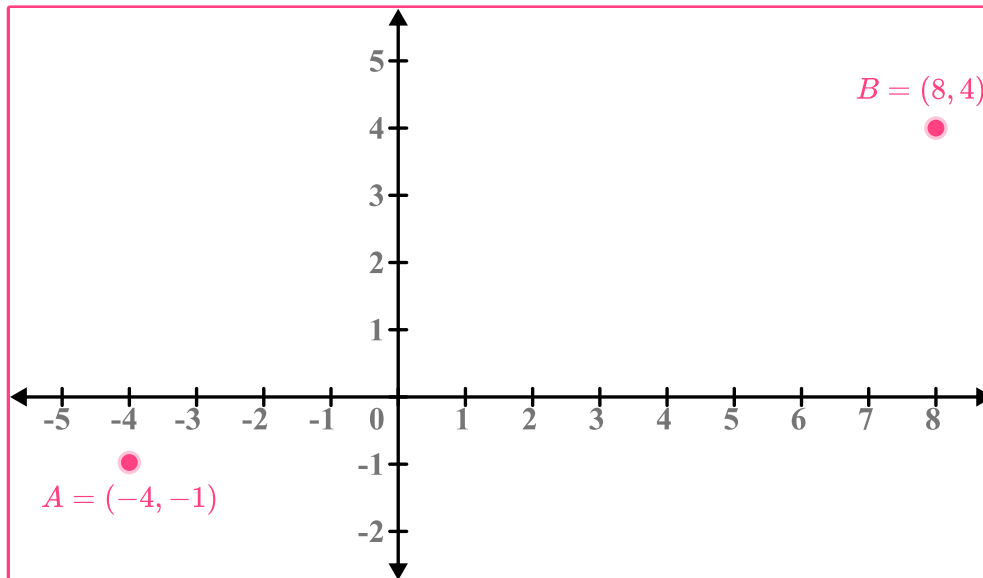


- A) 4 Student found the vertical distance between  $A$  and  $B$
- B) 5 Correct answer
- C) 25 Student applied Pythagoras' theorem but forgot to square root
- D) 7 Student found the sum of  $|x_2 - x_1|$  and  $|y_2 - y_1|$



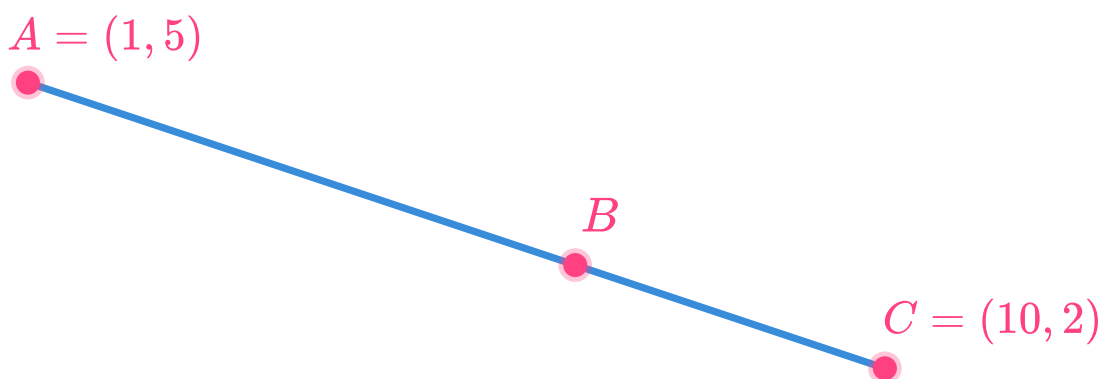
## Diagnostic Questions: Geometry in the Coordinate Plane Answers

9. Find the length of line segment  $AB$ :



- A) 12 Student found the horizontal distance between  $A$  and  $B$
- B) 17 Student found the sum of  $|x_2 - x_1|$  and  $|y_2 - y_1|$
- C) 13 Correct answer
- D) 5 Student made errors subtracting negative numbers

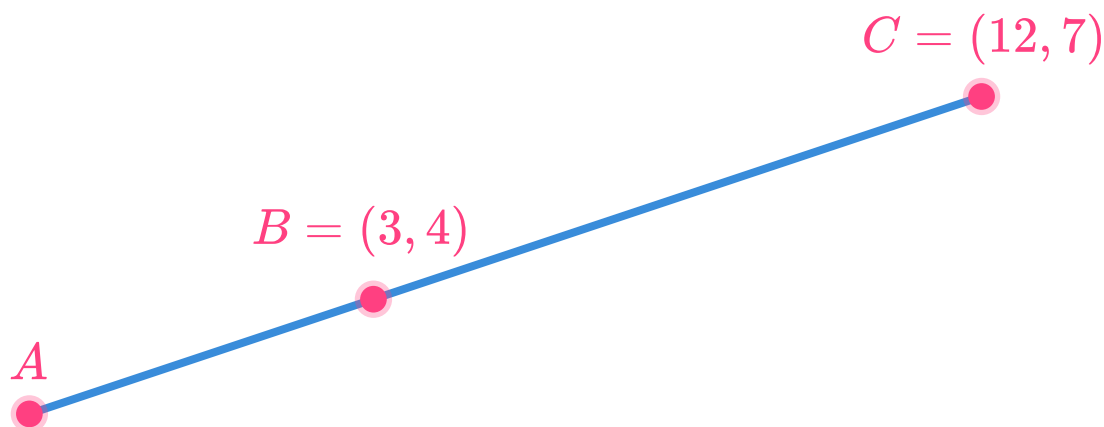
10. The point  $B$  lies on line segment  $AC$  such that  $AB : AC = 2 : 1$   
Find the coordinates of point  $B$



- A)  $(7, 3)$  Correct answer
- B)  $(4, 4)$  Student used the ratio the wrong way around
- C)  $(5.5, 3.5)$  Student found the midpoint of  $AC$
- D)  $(3, 6)$  Student added the components of the ratio to the elements of point  $A$

## Diagnostic Questions: Geometry in the Coordinate Plane Answers

11. The point  $B$  lies on line segment  $AC$  such that  $AB : BC = 2 : 3$   
Find the coordinates of point  $A$



- A)  $(-6, 1)$  Student used  $B$  as the midpoint of  $AC$   
 B)  $(-3, 2)$  Correct answer  
 C)  $(-10.5, -0.5)$  Student used the ratio the wrong way around  
 D)  $(1, 1)$  Student subtracted the components of the ratio from the elements of point  $B$

12. Straight line  $T$  has equation  $y = mx + c$ . Find the values of  $m$  and  $c$  such that:

- Line  $T$  is parallel to the line  $y = 2x + 1$
- Line  $T$  passes through the point  $(4, 5)$

- A)  $m = 2, c = 5$  Student used the coordinates of the given point incorrectly  
 B)  $m = 2, c = -6$  Student found the parallel line passing through  $(5, 4)$   
 C)  $m = 8, c = 6$  Student does not understand how to find a parallel line  
 D)  $m = 2, c = -3$  Correct answer

## Diagnostic Questions: Geometry in the Coordinate Plane Answers

13. Straight line  $Q$  has equation  $y = mx + c$ . Find the values of  $m$  and  $c$  such that:

- Line  $Q$  is perpendicular to the line  $y = 2 - \frac{x}{3}$
- Line  $Q$  passes through the point  $(1, -2)$

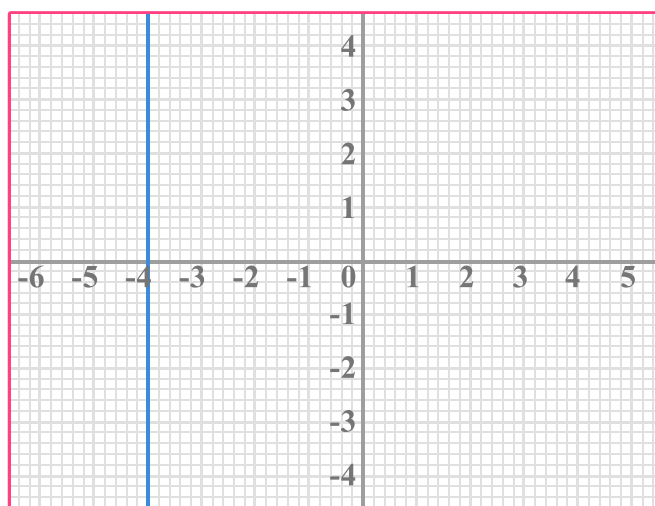
A)  $m = -\frac{1}{3}, c = -\frac{5}{3}$  Student found the parallel line passing through  $(1, -2)$

B)  $m = 3, c = -7$  Student found the perpendicular line passing through  $(2, -1)$

C)  $m = 3, c = -5$  Correct answer

D)  $m = \frac{1}{3}, c = \frac{7}{3}$  Student did not find perpendicular gradient correctly

14. Find the equation of this line in the  $xy$ -plane:



A)  $y = -4$  Student confused rules for horizontal and vertical lines

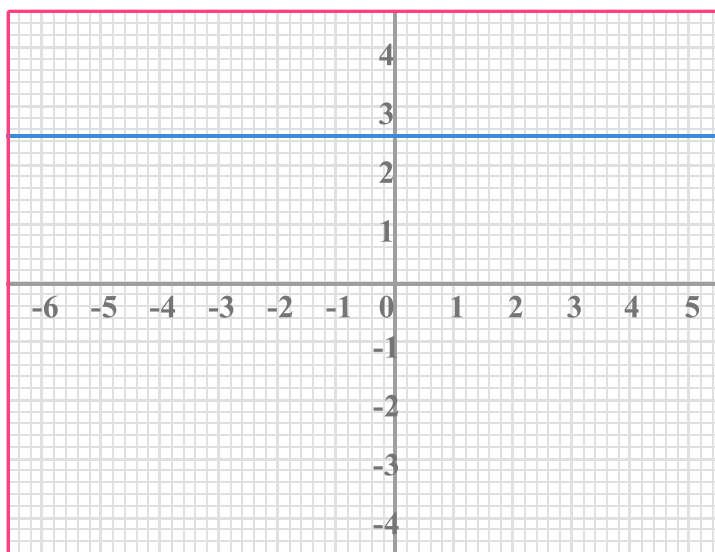
B)  $x = -4$  Correct answer

C)  $x = 4$  Student forgot to include the sign in their answer

D)  $y = x - 4$  Student does not understand how to write the equation of a vertical line

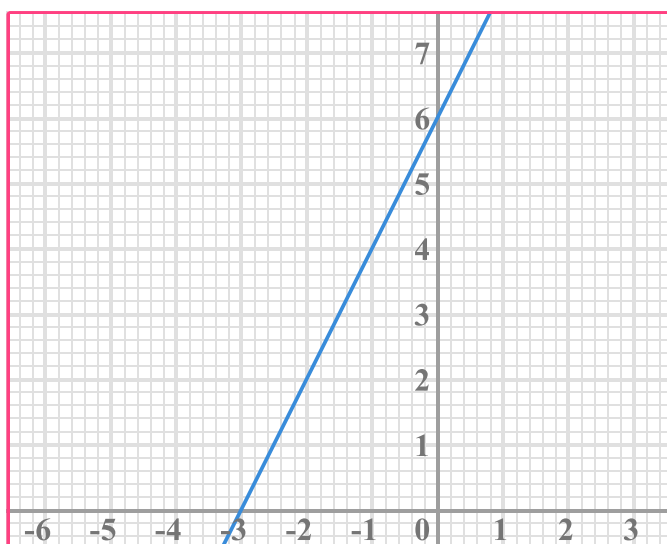
## Diagnostic Questions: Geometry in the Coordinate Plane Answers

15. Find the equation of this line in the  $xy$ -plane:



- A)  $y = x + 2.5$  Student does not understand how to write the equation of a horizontal line
- B)  $x = 2.5$  Student confused rules for horizontal and vertical lines
- C)  $y = 3$  Student rounded the  $y$ -value to the nearest integer
- D)  $y = 2.5$  Correct answer

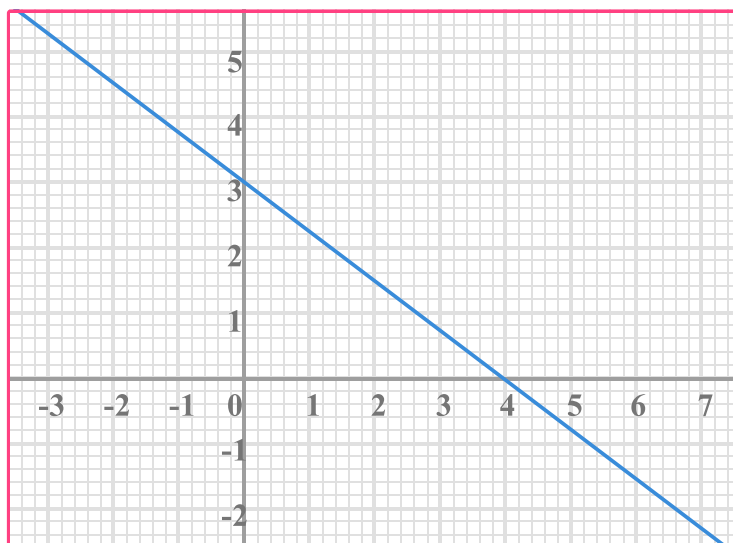
16. Find the equation of the line in the form  $y = mx + c$



- A)  $y = 2x + 6$  Correct answer
- B)  $y = x + 3$  Student attempted to simplify the right-hand side of the equation
- C)  $y = 2x - 3$  Student used the  $x$ -intercept as  $c$ , instead of using the  $y$ -intercept
- D)  $y = 6x - 3$  Student used  $x$ - and  $y$ -intercepts to form equation of line

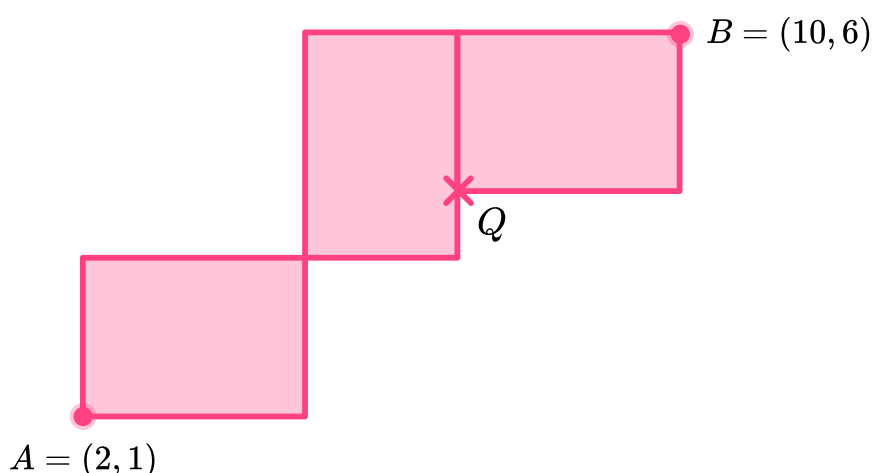
## Diagnostic Questions: Geometry in the Coordinate Plane Answers

17. Identify the equation of the line:



- A)  $3y + 4x = 12$  Student confused  $x$  and  $y$  values
- B)  $y = 3 - 4x$  Student used axis intercepts incorrectly
- C)  $4y + 3x = 12$  Correct answer
- D)  $3y + 4x = 0$  Student did not check axis intercepts

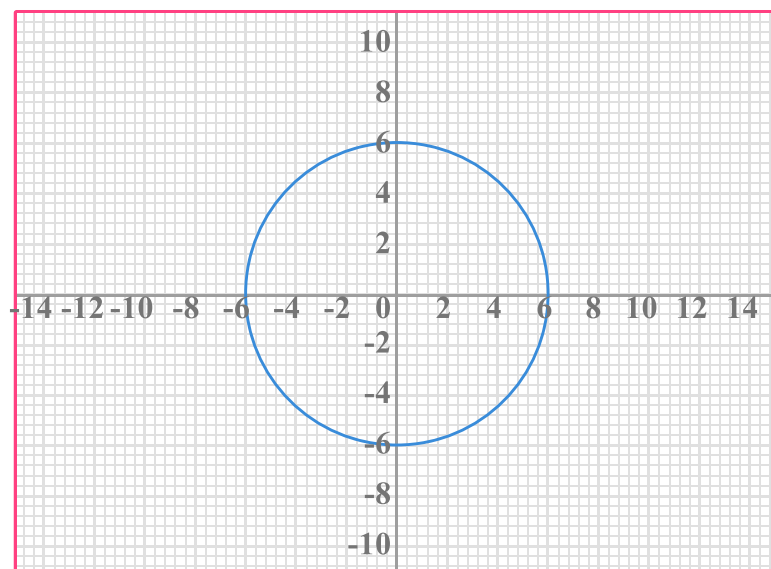
18. Three congruent rectangles are placed in the  $xy$ -plane as shown.  
Determine the coordinates of point  $Q$ :



- A) (6, 3.5) Student found the midpoint of  $A$  and  $B$
- B) (4, 2.5) Student divided the difference between components by 2
- C) (8, 3) Student found values for length and width of a rectangle, but subtracted incorrectly from point  $B$
- D) (7, 4) Correct answer

## Diagnostic Questions: Geometry in the Coordinate Plane Answers

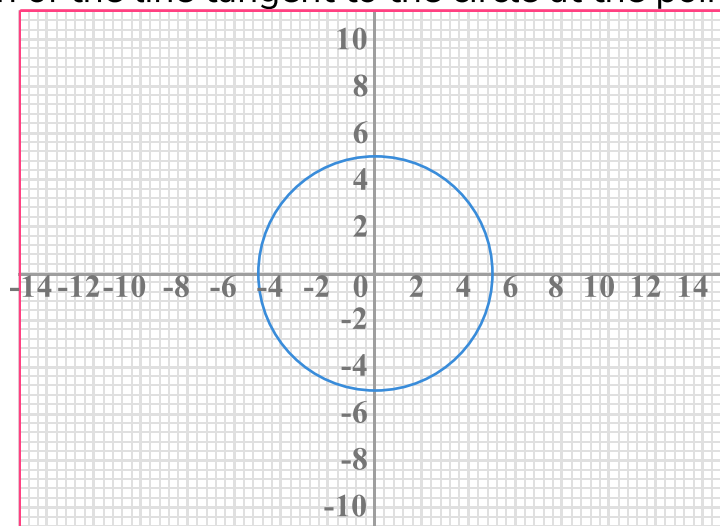
19. Determine the equation of the circle:



- A)  $x^2 - y^2 = 36$  Student made a sign error in the equation for a circle  
 B)  $x^2 + y^2 = 36$  **Correct answer**  
 C)  $x^2 + y^2 = 6$  Student forgot to square the radius of the circle  
 D)  $y = (x + 6)(x - 6)$  Student does not know how to write the equation of a circle

20. The equation of the given circle is  $x^2 + y^2 = 25$ .

Find the equation of the line tangent to the circle at the point (3, 4)



- A)  $y = \frac{4}{3}x$  Student found the equation of the line perpendicular to the tangent line, passing through the origin  
 B)  $y = \frac{3}{4}x + \frac{7}{4}$  Student forgot the negative sign for the gradient  
 C)  $y = \frac{25}{4} - \frac{3}{4}x$  **Correct answer**  
 D)  $y = -\frac{3}{4}x$  Student did not use the given coordinate to find the constant term

# Where to go next?

For more diagnostic questions, and GCSE maths revision resources and worksheets to support students in fixing any misconceptions take a look at the free Third Space Learning [GCSE maths revision](#) pages.

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